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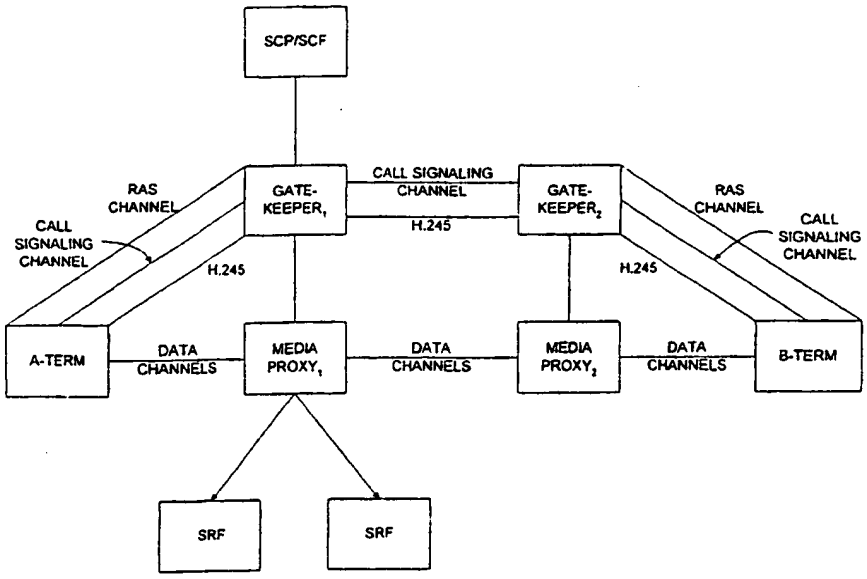
(54) Title: PROVIDING CONNECTION CONTROL FOR SEPARATE LOGICAL CHANNELS IN H.323 MULTIMEDIA




(57) Abstract: According to the present invention, a connection control for separate media components forming a multimedia stream transferred between two end-points each located in a network system is provided. For this purpose, media component control signaling between the end-points is monitored by routing means. Then, the routing means inform control means about separate media components, recognize the separate media components associated with a call between the two end-points and apply a connection control issued by the control means to the separate media components.



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TITLE OF THE INVENTION

Providing connection control for separate logical channels in H.323 multimedia.

FIELD OF THE INVENTION

The present invention relates to a method and a system for providing a connection control for separate media components forming a multimedia stream which is transferred between two end-points each located in a network system.

It is to be noted that, throughout the present invention, IN (Intelligent Network) designates any solution in which a call, connection or session processing node contacts a service control function (SCF) which issues instructions to the respective node. The contact to the service control function is based on a trigger information stored in the respective nodes, or downloaded there from external servers such as location registers. The trigger information may specify situations in the course of a call, connection or session handling. The service control function may be internally distributed. Moreover, the corresponding IN protocol could be any protocol between a controlling entity, such as a service control function, responsive to triggering from a call, and a session or connection node. The IN protocol may for example be an object oriented interface where the operations are object methods or invocations.

Further, it is to be noted that throughout the present invention H.245 designates any signaling used in media component establishment, modification and release. In addition, according to the present invention, the term gatekeeper designates any node responsible for call routing

and control and optionally other telephone switch type of functionalities like charging.

## BACKGROUND OF THE INVENTION

The ITU-T Recommendation H.323 specifies multimedia conferencing over packet networks. According to H.323 it is possible to have several media components in a multimedia call or session. These separate media components forming a multimedia stream are handled end-to-end outside the multimedia call establishment which is done using Q.931 signaling between a gatekeeper, a terminal and an external network such as PSTN (Public Switched Telephone Network). The gatekeeper is an H.323 entity which provides services like address translation and control access for network elements such as terminals and gateways. The media components are established using the H.245 signaling from end-to-end.

Similarly, in the IETF (Internet Engineering Task Force) IP (Internet Protocol) telephony protocol SIP (Session Initiation Protocol) the establishment and modification of multimedia streams is performed using end-to-end signaling. Its SDP (Session Description Protocol) definitions within the INVITE method inviting a user to a call are treated as H.245 signaling even though not intercepted from a media proxy, but from a SIP call processing server.

If current IN (Intelligent Network) architectures are applied to the gatekeeper, the gatekeeper is able to control the call routing and handling using known INAP (Intelligent Network Application Protocol) operations. However, if the media stream is established directly between the endpoints as performed according to H.323 and SIP specifications, the media stream is outside the control of the gatekeeper and further the SCP (Service Control Point) having a Service Control Function (SCF). Using media gateway control

protocols, the SCP is able to control an entire media stream composed of one component such as G.711 encoded voice, but the separate media components from a multimedia stream are not visible for an SCP.

The media stream may be composed of several media components routed via different paths.

Similarly, the separate media components cannot be connected to external resources separately.

## SUMMARY OF THE INVENTION

Therefore, it is an object of the present invention to provide services also for individual multimedia stream components.

According to a first aspect of the present invention, this object is achieved by a method for providing a connection control for separate media components forming a multimedia stream transferred between two end-points each located in a network system, comprising the steps of:

monitoring media component control signaling between the end-points;

informing control means about separate media components;

recognizing the separate media components associated with a call between the two end-points; and

applying a connection control issued by the control means to the separate media components.

According to a second aspect of the present invention, this object is achieved by a network system for providing a connection control for separate media components forming a multimedia stream transferred between two end-points, comprising:

routing means for monitoring media component control signaling between the end-points, informing control means about separate media components, recognizing the separate media components associated with a call between the two end-points, and applying a connection control issued by the control means to the separate media components.

According to the present invention, the routing means which may comprise call control means and media proxy means receive a media component control signaling message.

Moreover, the routing means may send a message to the control means and wait for a response from the control means. Further, the routing means which may comprise call control means and media proxy means may receive a message from the control means and send a modified component control signaling message from the call control means.

In addition, if the media component control signaling messages are routed via the media proxy means, the call control means may request report of media component related events from the media proxy means and the media proxy means may inform the call control means of the media component related events.

Furthermore, the multimedia stream may be routed via the media proxy means communicating with the call control means.

Moreover, the routing means may send a message from the call control means to the control means and wait for a response from the control means to the call control means.

Furthermore, the media component control signaling message may describe opening, closing or modifying a media component.

Further, the media component control signaling message may be in association with a call signaling message.

In addition, the media components associated with a call are recognized in the media proxy.

Finally, in order to provide connection control, the control means issue connection control requests to the call control means, the call control means issue connection control requests to the media proxy means and the media proxy means switch the media components in accordance with the connection control requests. The switching may involve media proxy switching IP packet payloads carrying a media component between an incoming and outgoing packet stream.

The connection control may not occur in all cases where the invention is applied. The indication of media component information to the control means without connection control may be beneficial to enforce for instance charging tariff determination in the control means.

In accordance with the present invention, media component related signaling (H.245) messages can be intercepted by the routing means to the control means. The messages can be modified and relayed further in accordance with the normal routing of the H.245 messages. In this way, the media component manipulations can be made invisible to the end-points. The control means can emulate an endpoint to the other endpoint. The separate multimedia stream components can be identified and switched separately by the proxy means.

In case SIP is used in a call processing node, the session description protocol definitions from the SIP INVITE method inviting a user to a call can be intercepted to the control means.

According to the present invention, the media component related detection points can be made into a separate media component statemodel which is parallel to the basic call statemodel. A connection view model of the separate media components and their states can be presented to the control means.

The present invention enables the use of specific IN services for separate multimedia stream components. Examples for such services are the control of a conversion loop, message modification and control of charging.

The terminal capability negotiations occurring during the call set-up can be intercepted by the routing means to the control means to enable the control means to modify the terminal capability information elements to reflect for example the conversion capabilities available via the conversion loops for the separate media components. The modified terminal capability information elements can be returned by the control means to the routing means to be relayed further in the continued terminal capability negotiations.

In the following, a preferred embodiment of the present invention will be described in connection with the accompanying drawing.

## BRIEF DESCRIPTION OF THE DRAWING

Fig. 1 shows an architecture of signaling between an IP network and an SC network with use of back-end services.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

Fig. 1 shows an IP (Internet Protocol) network adopting H.323 signaling, which may communicate with an SN (Switched Circuit) Network like PSTN (Public Switched Telephone Network) to which mobile or fixed phones are connected.

H.323 specifies multimedia conferencing over packet networks like the IP network. A call using H.323 signaling is the point-to-point multimedia communication between two H.323 end-points, either direct or via gatekeeper(s) and/or MCs (Multipoint Controllers). The media mix in a call can consist of audio, video and data streams. Audio communication has to be supported, video and data are optional. Media can be added, dropped or replaced dynamically during a call.

According to H.323, even a two-party call is considered as being a special case of a multiparty conference.

In the IP network shown in Fig. 1, a gatekeeper (gatekeeper1 or gatekeeper2) connects to a terminal (A-term or B-term) via an RAS (Registration, Admission and Status) channel, a media proxy and another gatekeeper. The gatekeeper which is a H.323 entity of the IP network provides address translation and control access to the IP network for terminals, gateways and MCUs (Multipoint Control Units). The gatekeeper also provides other services to the terminals, gateways and MCUs such as bandwidth management and gateway location.

The call set-up signaling can also be relayed via the gatekeeper. Similarly, the H.245 control signaling can be routed via the gatekeeper. According to the present invention, the gatekeeper is also controlling one or more media proxies, via which all the data channels carrying the individual media components can be routed. The gatekeeper is able to instruct the media proxy to perform connections on these data channels. The data channels can be connected to

other nodes like SRFs, upon instructions from the gatekeeper. The connections can be created, modified and deleted.

The end-to-end multimedia stream may comprise several media components routed along different paths, but they have to be routed via a media proxy under the control of a gatekeeper to enable connection control as requested by the gatekeeper. The routing via media proxies can be implemented in several ways, the gatekeeper may modify the media component establishment signaling message parameters to reflect the routing of the media component via a media proxy. In this way the packet traffic comprising a media component can be routed to the media proxy from the adjacent end-points or media proxies. Alternatively, the routing of the media component via media proxies can be enabled by providing routing information to the end-points.

The media proxy is able to identify the separate media components from the multimedia stream. The media proxy can perform switching of the individual media components separately. The identification of the separate media components can be performed by labeling the IP packets associated with a given media component with specific labels in the sending node. Alternatively, the media proxy checks the IP packets for other identifying information such as RTP (Real Time Protocol) port numbers. This is required because the different media components may have the same source and destination IP addresses. The gatekeeper must provide the media proxy with information on each call and its associated media components as soon as they are known by the gatekeeper. This information includes information that enables the media proxy to identify the separate media components. In this way, the media proxy can execute the connection control instructions from the gatekeeper and perform switching.

Similarly, the gatekeeper can instruct the media proxy on required bandwidth to be allocated for the data channels. The packets associated with the data channels associated with gatekeeperl processed calls are routed in the IP network via media proxyl.

According to an alternative embodiment of the present invention, the H.245 control signaling may also be routed via the media proxy.

According to the H.323 specification, several separate media components forming a multimedia stream are possible. These media components are established using H.245 end-to-end signaling. The H.245 signaling is adopted between two end-points or between an end-point and an MCU and provides plural functions such as capabilities exchange, opening and closing logical channels, flow control, media loop, etc.

According to SIP (Session Initiation Protocol), several separate media components forming a multimedia stream are as well possible. These media components are established using SIP INVITE methods and its responses carrying media component descriptions according to SDP (Session Description Protocol). These media component descriptions are contained in MIME (Multipurpose Internet Mail Extensions) format message bodies.

In case specific IN services of an SCP (Service Control Point) are to be used for the separate media components of the multimedia stream, the separate media components are to be made visible to the SCF.

Usually, each real-time media component is carried in a separate pair of uni-directional unreliable channels, one for each direction. A call with audio and video components therefore involves at least four logical channels. Data

traffic, however, uses a bi-directional reliable channel. Here, "reliable channel" means connection-mode transport, while "unreliable channel" refers to connectionless transport. In an IP-based scenario, this corresponds to TCP (Transport Control Protocol) and UDP (User Datagram Protocol), respectively.

Hence, the H.245 logical channels corresponding to the separate media components, respectively, must be made recognizable to the SCF.

Similarly, the existence of media components indicated in SIP messages must be made visible to the SCF.

According to the present invention, a method of implementing IN type control for the components of a multimedia stream is proposed. To this end, the states of the media component streams are modeled in the gatekeeper. If the H.245 control channel or its equivalent channel, which is used to open, close and modify media components, is routed via the media proxy or an equivalent node, the gatekeeper must be informed of each message affecting the states of the media components.

The modeling of the media component streams in the H.323 media proxy is done by monitoring the component specific H.245 signaling between the terminals or end-points of the communication. Similarly, an other media component control signaling like SIP INVITE methods can be monitored similarly to enable the modeling. An example for such a state model used for the media components is an IN CS-3 type of connection view model which is made visible to the SCF by the gatekeeper, possibly with media proxy assistance.

The state model according to the present invention includes detection points (DP) triggering messages which are sent to the SCF or SCP via the gatekeeper which has its own INAP

(Intelligent Network Access Protocol) for communicating with the SCP or via an own INAP interface of the media proxy.

Similarly, the invention enables the SCF to intercept logical channel descriptions from SIP methods like INVITE, to alter them and provide the modified description information to the gatekeeper.

Messages are triggered according to trigger criteria such as a digit string, cause value, specific origin, feature activation, nature of address or a combination thereof.

In accordance with this invention, the SCF can define detection point reporting criteria for the reporting of media component events signaling to the SCF. According to an embodiment of the present invention, the reporting criteria for detection points can define message types, message parameter values and parameter value ranges within a given message type. In most typical cases the H.245 messages like OpenLogicalChannel and CloseLogicalChannel can be reported to the SCF.

The reporting criteria can include logical operations such as AND, OR and NOT. For example, the reporting of media encodings not listed in the reporting criteria can be enabled.

According to the preferred embodiment of the present invention, the message type criterion can be omitted from the event report request, if the detection point identifies the message received. For instance, the SCF can set detection point reporting criteria on media component establishment message receipt in the gatekeeper (OpenLogicalChannel) with the criteria being such that the message indicates media types or encodings other than the ones listed by the SCF.

According to the preferred embodiment of the present invention, the media component control signaling related events are reported from a statemodel and connection view model parallel and subordinate to the basic call statemodel.

The H.245 messages can also be intercepted to the SCF by the gatekeeper from the call set-up and control signaling (Q.931, ISUP, SIP) received. According to another embodiment of the present invention, the H.245 messages embedded in call set-up signaling can be reported as extra parameters in the basic call statemodel related INAP operations. The call set-up signaling can be any signaling used to route the call from a caller terminal to a callee terminal via one or more gatekeepers.

The state model according to the present invention enables the SCF to intercept and alter H.245 signaling and connect the logical channels to different specialized resource functions (SRFs) separately.

Furthermore, the SCF is enabled to control the establishment and release of logical channels, reroute logical channels, allow the SCF to initiate logical channels to one end-point, etc.

The connection of the logical channels may involve the gatekeeper issuing commands to media proxy to redirect the logical channel flows to the different SRFs in case the logical channels are not routed via the gatekeeper itself.

The SRFs may perform various conferencing and encoding conversions for the logical channels which are connected to them. In order to be able to perform coding conversions, the SCF can command separate media components to a specific SRF loop connection. In this loop connection the media component is returned downstream back to the media proxy after the

conversion. This type of SRF connection can be identified using a specific INAP message or a ConnectToResource operation parameter.

Thus, the present invention enables the use of specific IN services for separate multimedia stream components. Examples for such services are the control of a conversion loop, message modification and control of charging.

The terminal capability negotiations occurring during the call set-up can be intercepted by the routing means to the control means to enable the control means to modify the terminal capability information elements to reflect for example the conversion capabilities available via the conversion loops for the separate media components. The modified terminal capability information elements can be returned by the control means to the routing means to be relayed further in the continued terminal capability negotiations.

The awareness of the SCF on the separate media components and operations (like conversions) being performed on them enables the SCF to determine current multimedia session tariff at any given moment. In this way prepaid services can be defined for multimedia sessions.

The above description of the preferred embodiments and the accompanying drawings are only intended to illustrate the present invention. The preferred embodiments of the invention may vary within the scope of the attached claims.

CLAIMS:

1.A method for providing a connection control for separate media components forming a multimedia stream transferred between two end-points each located in a network system, comprising the steps of:

monitoring media component control signaling between the end-points;

informing control means about separate media components;

recognizing the separate media components associated with a call between the two end-points; and

applying a connection control issued by the control means to the separate media components.

2. The method according to claim 1, wherein in the monitoring step call control means receive a media component control signaling message.

3. The method according to claim 1, wherein the informing step includes the steps of:

sending a message to the control means; and

waiting for a response from the control means.

4. The method according to claim 1, wherein the informing step includes the steps of:

sending a message to the control means;

waiting for a response from the control means;

receiving a message from the control means; and

sending a modified component control signaling message from call control means.

5. The method according to claim 2, wherein in the monitoring step, if the media component control signaling messages are routed via media proxy means, the call control means request report of media component related events from the media proxy

means, and the media proxy means inform the call control means of the media component related events.

6. The method according to claim 1, wherein the multimedia stream is routed via media proxy means communicating with call control means.

7. The method according to claim 1, wherein the informing step includes the steps of:

sending a message from call control means to the control means; and

waiting for a response from the control means to the call control means.

8. The method according to claim 2, wherein the media component control signaling message describes opening, closing or modifying a media component.

9. The method according to claim 2, wherein the media component control signaling message is in association with a call signaling message.

10. The method according to claim 6, wherein the media components associated with a call are recognized in the media proxy.

11. The method according to claim 10, further comprising a connection control step including the steps of:

issuing connection control requests from the control means to the call control means;

issuing connection control requests from the call control means to the media proxy means; and

switching the media components by the media proxy means in accordance with the connection control requests.

12. The method according to claim 11, wherein the switching step involves media proxy switching IP packet payloads carrying a media component between an incoming and outgoing packet stream.

13. A network system for providing a connection control for separate media components forming a multimedia stream transferred between two end-points, comprising:

routing means for monitoring media component control signaling between the end-points, informing control means about separate media components, recognizing the separate media components associated with a call between the two end-points, and applying a connection control issued by the control means to the separate media components.

14. The network system according to claim 13, wherein the routing means which comprise call control means and media proxy means receive a media component control signaling message.

15. The network system according to claim 13, wherein the routing means send a message to the control means and wait for a response from the control means.

16. The network system according to claim 13, wherein the routing means send a message to the control means, wait for a response from the control means, receive a message from the control means and send a modified component control signaling message from call control means.

17. The network system according to claim 14, wherein, if the media component control signaling messages are routed via the media proxy means, the call control means request report of media component related events from the media proxy means and the media proxy means informing the call control means of the media component related events.

18. The network system according to claim 13, wherein the multimedia stream is routed via media proxy means communicating with call control means.

19. The network system according to claim 13, wherein the routing means send a message from call control means to the control means and wait for a response from the control means to the call control means.

20. The network system according to claim 14, wherein the media component control signaling message describes opening, closing or modifying a media component.

21. The network system according to claim 14, wherein the media component control signaling message is in association with a call signaling message.

22. The network system according to claim 18, wherein the media components associated with a call are recognized in the media proxy.

23. The network system according to claim 22, wherein, for connection control, the control means issue connection control requests to the call control means, the call control means issue connection control requests to the media proxy means and the media proxy means switch the media components in accordance with the connection control requests.

24. The network system according to claim 23, wherein the switching involves media proxy switching IP packet payloads carrying a media component between an incoming and outgoing packet stream.

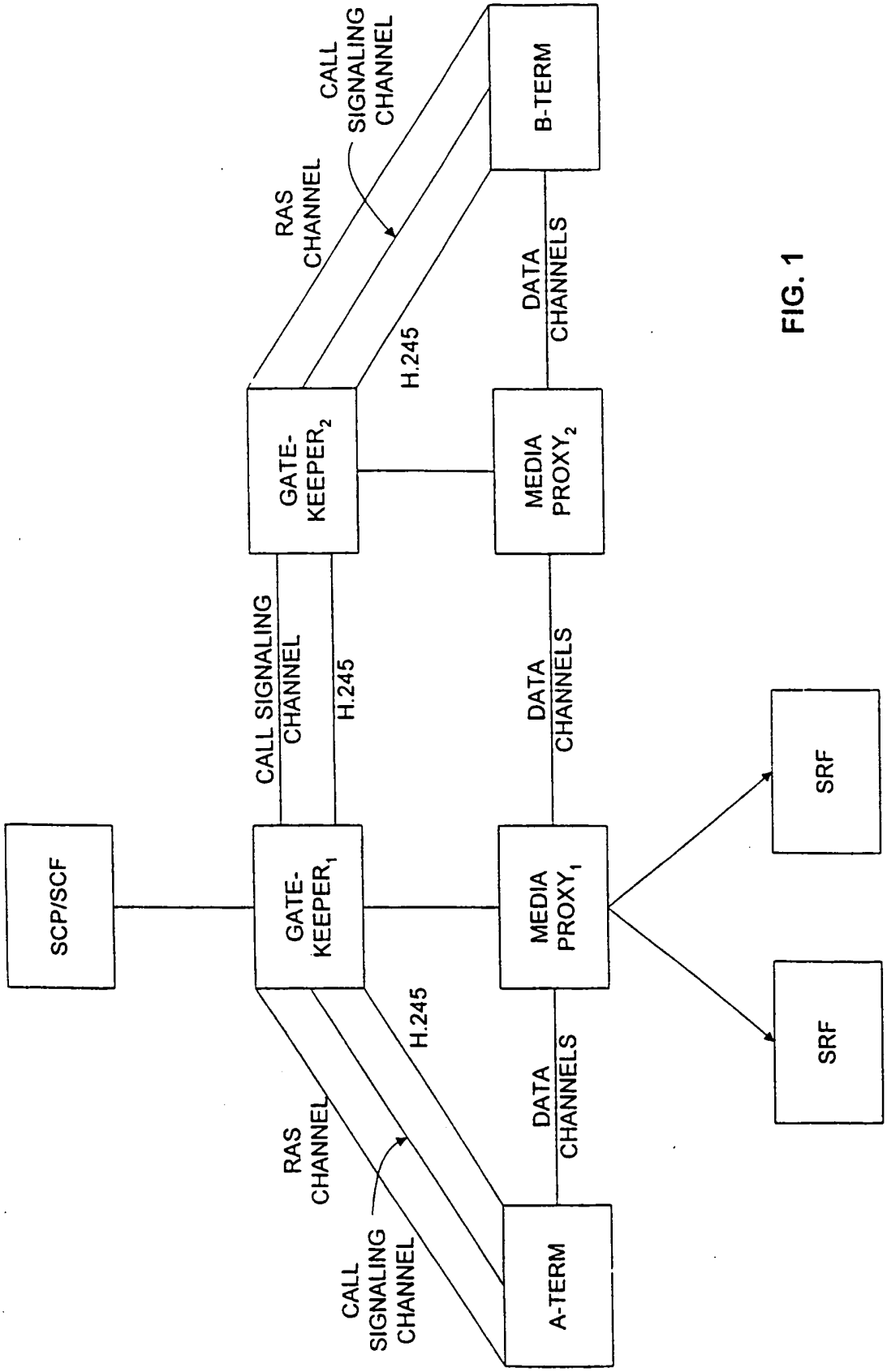
B-TERM
CALL SIGNALING CHANNEL
RAS CHANNEL
DATA CHANNELS
H.245
GATE-KEEPER$_2$
MEDIA PROXY$_2$
CALL SIGNALING CHANNEL
H.245
DATA CHANNELS
SRF
SCP/SCF
GATE-KEEPER$_1$
MEDIA PROXY$_1$
SRF
H.245
DATA CHANNELS
RAS CHANNEL
CALL SIGNALING CHANNEL
A-TERM

FIG. 1

# INTERNATIONAL SEARCH REPORT

Interna .ial Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04L29/06 H04Q3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04L H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 24 February 2000 | 08/03/2000 |

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Intern ial Application No
PCT/EP 99/04624

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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